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BUREAU OF
ENTOMOLOGY AND PLANT QUARANTINE
NEWS LETTER

VOLUME VII

2

UNITED STATES DEPARTMENT OF AGRICULTURE

BUREAU OF ENTOMOLOGY AND PLANT QUARANTINE

NEWS LETTER

FOR DECEMBER 1939

Vol. VII, No. 2 (Not for publication) February 1, 1940

FRUIT INSECT INVESTIGATIONS

Project for suppression of pear psylla in Northwest.--The finding in the Spokane, Wash., area of the pear psylla, an insect previously known to occur only in the northeastern part of the country, was reported in July. Surveys conducted in the Northwest have shown that the insect occurs only in the Spokane Valley area of Washington and Idaho. In order to prevent this insect from finding its way to the main commercial pear-producing sections of the West coast and to eradicate it from that area if possible, the Bureau is undertaking a control campaign in cooperation with the State agencies in that area. An initial allotment of $25,000 has been made by the Department from the appropriations for the control of incipient and emergency outbreaks of insect pests. This allotment will provide for the necessary expenditures for starting the work and for some of the needed equipment. The situation seems favorable for the control of the insect, as the distance to the large commercial plantings of pears is 100 miles or more and the intervening areas are mountain or desert. The fact that the pear psylla is very restricted in its food habits is another very favorable factor. Not more than about 10,000 trees are involved in the present known infested area. James F. Cooper, of the Spencer, N. C., Japanese beetle laboratory, is being transferred to Spokane to take immediate charge of the work.

MEXICAN FRUITFLY CONTROL

Fruitflies show increase.--More Mexican fruitflies were trapped in December than in any other similar period during the last 3 seasons. In December 1937, 11 adults were taken; in 1938, 8; and in 1939, 16. The number and variety of other flies also increased this past month. Specimens of 10 species in the genus *Anastrepha* were submitted for identification. Among these 1 unnamed species was represented by 9 specimens from 9 locations, *A. striata* Schin. was trapped in 3 groves, *A. chiclayae* Greene on 37 properties, and a total of 2,003 *A. serpentina* Wied. was taken from 373 trap locations. Fruit movement and certification activities reached a new high point in the history of this project. Through December 31 11,412.4 equivalent carloads of citrus fruits had been certified for movement from the regulated area. This amount is almost 8,000 carlots in excess of shipments to the same date in the 1935-36 season and is greater than any other entire season's production before 1936-37.

CEREAL AND FORAGE INSECT INVESTIGATIONS

European corn borer survival in hybrid sweet corn.--Morris Schlosberg, Toledo, Ohio, reports that field-plot tests of four single-cross strains of sweet corn, each having Michigan 1828 as a common parent, and including Spanish Gold and Golden Cross Bantam for standards of comparison, resulted in the differences in borer survivals among the strains being no greater than would be expected from the effects of measured variables and random variability, the resistance of 1828 failing to show in the hybrids tested for this one season of test.

Isolation of homozygous single- and multiple-generation strains of European corn borer.--K. D. Arbuthnot, New Haven, Conn., in reporting on the progress of his investigations of different strains of the European corn borer, indicates that apparently a homozygous single-generation strain of the borer has been isolated from laboratory rearings, whereas rearings of successive generations of multiple strains have been accomplished only with considerable difficulties. All except one multiple-strain line have been lost after three or four successive generations, owing to failure to obtain mated pairs, nonproduction of eggs by mated moths, or all of the eggs produced being infertile.

Second generation of European corn borer in Lake States.--A. M. Vance, of the Toledo laboratory, submits the following information, provided in part through cooperation with the State Conservation Department of Indiana and the Agricultural Experiment Station of Geneva, N. Y.: Some evidence of midsummer pupation of the corn borer was found in 22 of the 35 counties surveyed in Indiana in the fall of 1939. Such pupation was noted in 11 of the same counties in the fall of 1938. The average pupation for the region, according to the fall-survey data, increased from 0.7 in 1938 to 2.6 in 1939. Immature borers, presumably of a second generation, were observed in 30.4 percent of the 787 fields surveyed in Indiana in 1938 and in 32.4 percent of the 794 fields examined in that State in 1939. Although the presence of 2 generations of the borer annually was noted in all 35 counties surveyed in Indiana in 1938 and 1939, it was most pronounced in the 11 counties of Randolph, Delaware, Blackford, Wells, Jay, Whitley, Huntington, Allen, Adams, Wayne, and Noble in the eastern part of the State. Here 68 percent of the fields examined, in the above 2 years combined, were infested to some extent by a second generation of the insect. Near Toledo midsummer pupation among 2,077 specimens of the borer, examined in 25 fields of early sweet corn in 1939, averaged 11.8 percent, as compared with 11.3 percent found in an examination of 4,398 individuals in the same number of similar fields in the locality in 1938. Evidence of midsummer pupation was also obtained in 14, or 23.7 percent, of the 59 counties of Ohio surveyed in the fall of 1939. Within 12 comparable counties in the northwestern part of the State such pupation averaged 1.7 percent in 1939, as compared with 0.9 percent in 1938. Scattered records of a second generation of the borer were obtained in 5 counties of western New York during the fall survey of 1939 and an appreciable second generation occurred during the summer in the Hudson River Valley and on Long Island.

JAPANESE BEETLE CONTROL

Extend validity period of Japanese beetle quarantine certificates.--Class I (uninfested) nurseries and greenhouses in the Japanese beetle regulated area were notified late in December that beginning Janurry 1, 1940, certificates issued to them would bear the void date of June 30, 1940, and that they would not be called upon to account for the usage of their certificate supply until the expiration of the void date. Periodic check-up visits will, of course, be continued to these establishments as heretofore to assure that adequate records are being maintained. Heretofore certificates have been supplied to these establishments on a monthly basis, valid only to the end of the month. This has resulted in a considerable waste of certificates when shippers have overestimated their needs for the current month. To conserve the certificate supply, an extended void date was proposed. This was approved by the Chief of the Bureau. This revised procedure has met with a very favorable reception on the part of the shippers affected since it will reduce to a minimum the reporting routine involved in their use of Japanese beetle quarantine certificates. Class III or infested establishments are not accorded the same privilege, as certificates are issued to them only for stock that is soil-free or has been grown, treated, or fumigated under specified conditions.

Japanese beetle regulatory activities in New Jersey.--December certification of plant material for shipment from New Jersey to points outside the regulated area was nearly doubled, as compared with that in 1938. Methyl bromide fumigation continued to gain popularity in the State, with 11 establishments now operating their own fumigation chambers. Approximately 300,000 plants have been fumigated in the State since this procedure was authorized. Until about December 20, New Jersey inspectors were busy with the certification of greenhouse plants moving in the Christmas trade. Prices in general were reported as better than in 1938. Open weather early in December permitted nurserymen to dig stock for storage and early spring delivery. Roses in carlots started to move from New Jersey establishments to southern points almost a month earlier than usual. Growers reported a good market for dormant roses in the Southern States. Small fruits, such as raspberries, apparently were in considerable demand in the Carolinas. An inspector supervising the washing of soil from the roots of 500 hydrangeas counted over 1,200 Japanese beetle grubs which were washed out during the soil-freeing operation.

Violation questionnaire detours by way of China.--On October 14, 1937, a transit inspector of the Bureau intercepted a parcel-post shipment containing one potted sedum plant destined from Lewisburg, Pa., to Manitou Springs, Colo., without the required Japanese beetle quarantine certificate. Upon receipt of the inspector's report at the divisional field headquarters a questionnaire form was mailed to the consignor requesting details of the shipment and informing him of the quarantine regulations. No return of the form having been received, a second request was later mailed. Not until early in December 1939 was a reply received. It came from the consignor, now a medical missionary at the American Presbyterian Mission at Kiulungkiang, Yunnan, China. The envelope had been opened by the censors and was resealed with a strip labeled, "Controle Postal Militaire."

Incidental benefits from methyl bromide fumigation reported.--A large hydrangea grower in the Baltimore, Md., area who has constructed a methyl bromide fumigation chamber to meet Japanese beetle quarantine requirements, claims that all of his stock is benefited by this fumigation. Not a single complaint has been received from any of his customers. His specialty hydrangea, a patented variety, does exceptionally well after fumigation, as the larger plants drop their leaves about 7 days after being gassed. Consequently, they do not have to be transferred to cold storage to accomplish this defoliation. He can therefore prepare plants much earlier for spring show purposes. A report from the field supervisor in the Harrisburg, Pa., district states, "One of our shippers equipped with a methyl bromide fumigation box is using it for fumigating plants for pests other than Japanese beetles and thinks it a fine thing to have."

Fire hose needed to free soil from veneer logs.--Two carloads of walnut logs with stumps attached were certified at Conowingo, Md., for shipment to a veneer establishment at Mooresfield, W. Va. Conowingo is in one of the most heavily infested sections of Maryland and both cars and logs were inspected for Japanese beetle to prevent infested material being carried out of the infested zone. Owing to the condition and nature of the soil adhering to the roots it was necessary to use a fire hose to make the shipment soil-free and eligible for certification.

Speeding-up corn borer life cycle.--In cooperation with the Division of Control Investigations, staff members of the New Jersey district office at White Horse have installed incubation cages in the greenhouses to hasten the life cycle of the European corn borer. It is desired to obtain data before winter is over concerning the effect of methyl bromide on the eggs, larvae, and pupae of the borer. Chrysanthemums, gladiolus, and potatoes are being grown for host plants for the various stages of the insect. If methyl bromide fumigation is effective in killing these stages of the borer, plants fumigated with this material in conformity with Japanese beetle quarantine regulations will be eligible for joint certification under both Federal Japanese beetle and State European corn borer regulations. Later field tests of normally reared borers will be made to confirm results with the forced generations.

Gypsy moth infestation found in trees returned to regulated area.--Inspectors operating in the New York City wholesale cut-flower market during the Christmas holidays discovered a truckload of Christmas trees that the driver stated had been cut in the generally infested gypsy moth area. Consequently, they were not eligible for movement from the regulated zone. Return of the trees to the infested area was ordered. When the driver reported to the district inspector at Westerly, R. I., for identification of the load as to point of origin and for possible inspection, the driver stated that the trees originated in Waterville, Maine, in the generally infested area, from which Christmas trees may not be certified. Later, the driver claimed that the trees had been obtained in Bingham, Maine, a point outside the regulated area. As a preliminary measure, the district inspector examined 6 of 75 bundles on the load and in these he found 6 gypsy moth egg clusters. As the trees obviously had been cut in the generally infested area and contained numerous egg masses, further inspection was refused. The driver was required to dispose of them within the generally infested zone.

Increase in Christmas-tree inspection.--A combination of increased business and ideal weather conditions during the Christmas-tree cutting and inspection season, November 1 to December 23, contributed to an increase in the quantity of trees inspected, as compared with the previous season. This year 448,246 Christmas trees were inspected in the lightly infested gypsy moth area. This was more than a 30-percent increase over 1938, when 343,398 trees were similarly certified. Weather conditions were unusually favorable for inspection of both Christmas trees and greenery this year. Only 1 gypsy moth egg cluster was removed from a Christmas tree in connection with this year's inspection activities.

Bough-lot inspection in southwestern Vermont shows increased infestation.--Scouting in bough lots in the lightly infested area of southwestern Vermont showed a heavy increase in gypsy moth infestation, as compared with that found in 1938. In the towns of Dover, Halifax, Wilmington, Whitingham, Readsboro, and Searsburg, Vt., 23 bough lots were found infested with a total of 65 egg masses. It was necessary to make actual inspection of many tons of boughs from infested lots. About 95 percent of these were spruce boughs cut from 3 to 4 feet in length and put up in 100-pound bales. The principal markets to which they were shipped were St. Louis, Mo., and New York City. In the course of the entire season's piece-by-piece inspection of evergreen boughs throughout the lightly infested area, 295 gypsy moth egg clusters were removed from 28,620 pounds of material examined prior to its use in making wreaths.

Arts and Crafts course increased small greenery inspections.--A report from the district inspector in the Bangor, Maine, district states that shipments of Christmas greenery were stimulated by a State program of the Arts and Crafts group. Included in this program was instruction in the manufacture of wreaths, garlands, and centerpieces. Demonstrations and talks were given in small centers and rural hamlets where materials were easily procured. Many of the learners desired to ship their products to points outside the gypsy moth regulated area, thereby necessitating additional travel by the inspector over secondary roads and increasing the number of small lots of material certified.

Gypsy moth infested maple logs.--One unusual inspection during the month involved the examination at Windsor, Vt., of a carload of large maple logs cut at Cornish, N. H., and consigned to a manufacturing company in Millville, N. J., for finishing into rollers for millwork. Most of the logs were from 4 to 5 feet in diameter and from 12 to 16 feet in length. From three of these logs, seven gypsy moth egg masses were removed.

Elm infected with Dutch elm disease changes local objective from elm sanitation to clear-cutting.--With the finding of an infected elm in a beaver swamp in Crawford Township, Orange County, N. Y., extensive elm-sanitation operations begun there last summer were changed to a program of making this an elm-free area. Crews have been working there for months under adverse conditions, attempting to remove all elms infested with elm bark beetles and all elms likely to become infested. About 1,500 elms were in the swamp at the time permission was obtained for the sanitation work. Many of these were in water up to depths of 5 to 6 feet. The recent confirmation, a 12-inch D. B. H. tree, was standing in 3 feet of water. Upon removal it was found infested with Scolytus multistriatus Marsh. There had been some emergence of the beetle from the tree. Indications were that it was infected with the Dutch elm disease fungus during the summer of 1939. The beaver swamp from which this tree was removed is full of elms literally riddled with S. multistriatus. Raising of the water level because of the beaver swamp has caused many of the trees to die. Crawford Township is near the border of the infected zone. The first infections were found there in 1939. Six confirmations have been reported from the township to date. The nearest previous confirmation is 2 miles to the southwest. There are two confirmations to the north of the swamp infection. It is planned to clear this swamp of elms this winter.

Autogiro relicensed.--On December 15 the Division's 420-hp. Pitcairn autogiro N.C. 2740 was inspected and relicensed by the Civil Aeronautics Authority for the next 12-month period. At the same time the only two pilots remaining on the Division's payroll were granted 3-S rotorplane ratings, which entitled them to operate single-engine autogiros with gross weights between 4,000 and 10,000 pounds, the classification of N.C. 2740. The other four Bureau-owned autogiros do not require relicensing at this time. Autogiro N.C. 11612, owned by the Division of Gypsy and Brown-Tail Moth Control, stopped at the U.S.D.A. airport at Preakness, N. J., on December 10 for temporary storage while en route from Texas back to its Massachusetts field base.

Rain and snow permits burning.--Snow and rain in mid-December were a decided advantage to the Dutch elm disease eradication program, in that they eliminated fire hazards and permitted the crews to do a large amount of clean-up work by burning accumulated wood piles.

Dutch elm disease infection reduced in Union County, N. J., parks.--According to the annual report of Ralph H. Carver, chief plantsman of the Union County Park Commission, only 83 diseased elms were located and removed from parks under the supervision of the County Commission during 1939. This was 80 percent fewer than the number destroyed in 1938. The eradication campaign in the parks also included the removal of 553 noninfected but dead and dying elms.

First-record infections.--Two first-record infections were removed during the month, both located in Warwick Township, Bucks County, Pa. These new cases add another township of 11.5 square miles to the infected zone, increasing to 698.61 square miles the area infected in Pennsylvania.

Correction.--In the December 1, 1939, issue of the News Letter, on page 4, under the heading, "Dual-purpose inspection," the disease reported as "red seal" should read "red stele."

FOREST INSECT INVESTIGATIONS

Tests with sprays to prevent breeding of smaller European elm bark beetle.--R. R. Whitten, Morristown, N. J., reports that as a result of a limited demand for a spray to prevent Scolytus multistriatus Marsh. from breeding in elm wood, experiments were conducted from 1936 to 1939 with various materials. Six formulae ranging in cost from $0.218 to $0.688 per gallon were found to effectively repel S. multistriatus, Hylurgopinus rufipes Eich., and certain cerambycids for the entire active season when applied in May. They were also found to considerably reduce the amount of attack when applied from September to April, inclusive. All these mixtures when applied to small samples of from 17 to 37 square feet required an average of 3 quarts to thoroughly treat 25 square feet of bark. This figure is unquestionably higher than would be necessary for larger samples, as a considerable portion was always wasted on the ground. The most effective materials were found to be orthodichlorobenzene, monochloronaphthalene, and naphthalene when used with a fuel oil or kerosene.

Ladybird beetles in hibernation.--According to H. J. Rust, Coeur d'Alene, Idaho, an unusually heavy concentration of the convergent ladybird beetle (Hippodamia convergens Guer.) was observed on December 13, 1939, near the head of Nettleton Gulch, on the Coeur d'Alene National Forest. The adults were distributed over an area of approximately 1/4 acre, where under bits of bark and decaying logs they occurred in masses from 2 to 4 inches deep. Without much basis for the estimate, it is believed that there were at least 3 bushels of these insects. This is the largest hibernation of these beetles recorded by this laboratory.

Overcrowding hampers development of mountain pine beetle.--W. D. Bedard, Coeur d'Alene, says that when too many mountain pine beetles attack within a limited area of bark surface, the resultant overcrowing destroys much of the available food material and causes a decrease in the abundance of broods produced. An examination of 295 western white pine trees, containing 58,660 square feet of infested bark, showed the following:

Attacks per square foot	Mountain pine beetle brood per square foot
Number	Number
1 - 4	20.6
5 - 6	25.8
7 - 12	27.4
13 - 14	16.3
15 and 18	9.0
28 and 36	4.7

Thus it is seen that with an increase in number of attacks there is an increase in the abundance of broods produced until the optimum number of attacks is reached. From this point, any increase in the number of attacks results in a decrease in the abundance of brood.

Recoveries of European spruce sawfly parasite.--P. B. Dowden, New Haven, Conn., reports that during the last 4 years a very extensive program of propagating and liberating Microplectron fuscipennis Zett. has been conducted in Maine, New Hampshire, Vermont, and New York. More than 140 million of these gregarious cocoon parasites have been liberated in

Maine and more than 23 million in the other 3 States. Practically all of this work has been done by the States involved. The Bureau's forest-insects laboratory at New Haven, Conn., has cooperated by liberating many of the colonies in 1937 and 1938 and by supplying facilities for rearing much of the material liberated in New Hampshire, Vermont, and New York. No detailed program for the recovery of Microplectron has been attempted by the New Haven laboratory, but cocoon collections have been made from time to time which indicate that the species is widely established. The following list indicates the number of towns where this parasite has been recovered and for which the New Haven laboratory has records.

State	Towns Number
Maine	8
New Hampshire	6
Vermont	3
New York	7
Massachusetts	1
Connecticut	1

Practically all of the recovery collections have been small lots of cocoons, which indicate no more than the establishment of the parasite.

Any evaluation of the parasite's effectiveness at this time would be premature, but one permanent study plot at Dublin, N. H., has shown interesting data. This plot comprises 4 acres of pure red spruce, averaging 9 inches in diameter. The ground cover seems very favorable to Microplectron in that it is largely composed of dead needles and duff. Three colonies totaling 30,000 Microplectron were liberated within a few hundred yards of this plot in 1938 and several hundred thousand were liberated in other parts of the town. Ninety-nine square-foot samples of duff were taken in the plot in the fall of 1939. Analysis showed that these samples had 1,110 cocoons containing living sawfly prepupae and 132 cocoons containing living Microplectron. In addition, there were 42 cocoons which previously had produced Microplectron adults. Fifty parasitized cocoons were dissected and they contained an average of 40 parasites per cocoon.

Low temperatures in fall cause high mortality of gypsy moth eggs.--According to H. A. Bess, New Haven, during the winter of 1938-39, field studies were made on the influence of low winter temperatures on the mortality of gypsy moth eggs. The egg clusters used in these studies were collected in Bartlett, N. H., about October 1, and approximately 30 egg clusters were mounted on each of 12 boards. Six of the boards were hung in a weather instrument shelter located at Bartlett and the other 6 in a smaller shelter at Gale River, N. H. One board was removed from each shelter on the last day of each month from November through April. On removal, the egg clusters were isolated in small boxes, placed in a heated room, and later examined to determine the number of larvae that hatched from the different lots. The average hatch per cluster for the different lots and the minimum temperature for each month are given in the table below.

Month	Bartlett		Gale River	
	Minimum temperature	Average hatch per cluster	Minimum temperature	Average hatch per cluster
	°F.	Number	°F.	Number
November----	-10.0	[1]310 ± 24.4	-20.0	0
December----	-11.5	262 ± 25.2	-11.0	0
January-----	-20.0	2 ± 1.1	-28.0	0
February----	-12.0	3 ± 1.2	-15.0	0
March-------	--	7 ± 2.2	-18.0	0
April-------	--	7 ± 2.3	0	0

[1] Standard errors are used in preference to probable errors.

A temperature of -20° F. in November was sufficient to kill all of the eggs, whereas a few survived at this temperature in January. This indicates a conditioning of the eggs to cold and that eggs can withstand lower temperatures in January than in November. It is significant that there was no increase in mortality after the last of January. This study was made possible through the cooperation of the staff of the Experimental Forests of the Northeastern Forest Experiment Station located at Bartlett and Gale River.

C. C. C. aids in collecting European spruce sawfly cocoons.--Frank E. Miller, Jr., a collaborator at New Haven, reports that in order to obtain the 5 million cocoons desired for parasite rearing by the New England States and New York, C. C. C. enrollees were engaged for collection work in the Wilmington, Vt., and the Jaffrey, N. H., areas for a period of 5 weeks--from October 1 to November 6. In order to obtain the cocoons, 900 bushels of moss and ground litter (nearly 23 tons) were handled. It was necessary to screen this material twice and then pass it through a winnowing machine before the cocoons were satisfactorily cleaned. The cocoons collected were distributed as follows: Maine, 3,380,000; Vermont and New York, 850,000; New Hampshire, 500,000. While most of these cocoons will be used for the rearing of *Microplectron fuscipennis* Zett., it is hoped that other parasite species may also be propagated.

Increased pine beetle activity on recent cut-over areas during 1939.--J. W. Bongberg, Berkeley, Calif., states that a considerable increase of pine-beetle activity was observed in 1939 in the reserve stand on areas recently cut over by the Fruit Growers' Supply Company in the eastern Lassen area, Lassen National Forest, Calif. This infestation was made up of top-killing engraver beetles (*Ips oregoni* Eichh.) and broods of the western pine beetle (*Dendroctonus brevicomis* Lec.). Large patches of reproduction and many vigorous trees in the reserve stand were killed. The engraver beetles were responsible for the initial attacks in the reserve trees and the death of the reproduction. The western pine beetle readily attacked the remaining green bole of the previously top-killed trees. As many as 23 trees were found in a single group, within an area of approximately 2 acres, and numerous other smaller groups were scattered over the cut-over area.

Mountain pine beetle in Big Tree Grove controlled.--G. R. Struble, Berkeley, reports that considerable damage to mature sugar pines within the Grove area in Yosemite National Park in 1939 resulted from aggressive attacks by *Dendroctonus monticolae* Hopk. An insect survey made in September revealed that 108 trees, having a volume of 437,630 board feet, were killed since October 1938. Control work by National Park Service C. C. C. crews, begun early in October 1939, had treated all the infested trees within the area by the middle of November. All infested trees were treated by felling and burning the infested bark.

Serious Cylindrocopturus damage in pine plantations.--R. C. Hall, Berkeley, says that very serious damage caused by the weevil *Cylindrocopturus longulus* Lec. has been observed during the 1939 season in a Jeffrey and ponderosa pine planting in the Big Springs Brush Field of the Lassen National Forest. There appears to be a definite relationship between size of stock and injury, with the small, recently planted material suffering little, but the injury progressing with age and size of stock where very serious damage occurs in the oldest and largest stock, which is about 5 years of age. In these older plantings the mortality due to this insect often approaches 100 percent. One sample count of 147 original trees showed only 7 living in the fall of 1939. A general reconnaissance has shown this insect to be quite generally distributed in natural seedlings throughout the Hat Creek Basin. Control of this insect in the Big Springs Planting by pulling and burning infested stock is contemplated for next spring.

GYPSY MOTH AND BROWN-TAIL MOTH CONTROL

Diverse conditions affect gypsy moth work in various States.--The month started with two snowstorms, accompanied by high winds sweeping across the northern half of Vermont. The snow drifted to a depth of 4 feet or more, effectively closing many of the back roads to automobile travel. The blocking of the roads forced the suspension of gypsy moth work in some sections. Snow, sleet, and rainstorms during the second and third weeks left the highways extremely icy, the heavy rains caused the snow to melt and settle, and foot travel improved materially during this time. Clearing weather during the latter part of the month provided exceptionally favorable scouting conditions. In Massachusetts and Connecticut similar conditions, in general, were present, with icy roads hampering transportation and stormy days hindering scouting operations at times. The crews were detailed to ground work, where they creosoted egg clusters, chopped down dead and worthless trees, and assembled and piled deadwood in preparation for burning. Several of the days that were unsuitable for scouting were ideal for burning great quantities of brush and other waste wood. During the last week in December it became possible to inspect tree growth in swampy areas in both States and to begin thinning work in areas that bordered infested locations. This work had been necessarily delayed until the surface had frozen sufficiently to sustain the weight of the men. In Pennsylvania an ice storm in the Pocono Mountains in the eastern part of the State the first week in December made traveling hazardous and temporarily hampered scouting work in that section. The stormy weather prevalent over the Eastern States during the second week did not interfere with gypsy moth work in Pennsylvania as greatly as in the other States, as the crews had been withdrawn from the woodland areas during the hunting season, from December 1 to 15, and were working in more accessible sections. Absence of snow during the latter part of the month in the areas where gypsy moth work is conducted permitted the continuance of ground work at infested sites. Workers from the State Department of Public Assistance performed some of this work in selected areas in Pittston Township, Luzerne County, while all work of this nature at outlying infestations was done by W. P. A. employees. Scouting conditions were also good, and National Youth Administration crews performed intensive scouting work in a series of towns bordering the Lackawanna River on the east, with W. P. A. crews also working in these towns and in the remainder of the quarantined area.

Few gypsy moth fences dismantled up to December 1.--As a result of the mild weather and absence of snow during November, very few farmers had taken their cattle from the pastures at the end of the month. Consequently, it was necessary to delay the dismantling of the temporary fences erected last spring to prevent the cattle from feeding in areas that had been sprayed with lead arsenate until the winter storms began. Some of the fences strung with considerable difficulty across extremely rugged, ledgy and rocky land may be left undisturbed until it is definitely determined whether gypsy moth infestations still persist to an extent sufficient to warrant respraying next June, provided this can be done with the approval of the property owners.

Old motor oil used to kindle fires quickly.--Salvaged burlap strips saturated in old crankcase oil has proved to be a very satisfactory method of firing brush piles quickly. As burning is done only during rainy weather or when snow is on the ground, the brush piles are often wet and do not readily ignite by ordinary methods. The oil-soaked burlap burns hotly, dries up the brush, and starts it burning in a very short time. Supplies of used motor oil accumulated over a period of about 8 months at the gypsy moth storehouses in Wilkes-Barre, Pa., and Greenfield, Mass., have been drawn upon heavily during December, when conditions were especially favorable for burning work.

Heavy coatings of ice cause misshapen trees.--Gypsy moth scouting crews working in Berkshire County, Mass., found many stands of sapling growth so bent over that it was necessary to discontinue work temporarily in such stands until the ice had melted sufficiently for the trees to straighten up somewhat. It often happens that trees that have been badly bent under heavy weights of snow and ice never straighten up again. This is particularly true of gray birches. It is difficult to conduct some gypsy moth control measures, notably spraying and scouting, in such areas, until the worst tangles of growth have been removed by thinning.

First-aid treatment reviewed by crew leaders.--While serious accidents seldom occur in gypsy moth work, minor injuries such as sprained ankles, cuts, and scratches are sometimes suffered by the men. Practical demonstrations of approved first-aid methods are given periodically in order to keep them fresh in the minds of the crew leaders. Such a demonstration was given on November 28, when a complete review of first-aid instructions was given to an assembled group of supervisors and agents in Connecticut.

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Several small gypsy moth infestations found in Vermont.--A small gypsy moth infestation was discovered in Middlebury, Addison County, Vt., near the site of an assembling cage that attracted male gypsy moths last summer. Although work had not been entirely completed at the time of the last report, it was not expected that the eradication of this infestation would prove difficult. Two infestations were recently located in Granville, also in Addison County, one at an elevation of approximately 2,200 feet and the other at about 1,700 feet. A cursory examination of the areas indicated that favorable food plants were not abundant at either location. It was impossible to accurately determine the size of the infestations at that time, as some 6 inches of snow effectively hid egg clusters that may have been deposited on stumps, stones, and ground litter. Further work at these infestations will be done when ground conditions become favorable. Several additional infestations were found in Vermont during the month, all of which were comparatively small. The scarcity of old egg clusters indicated that these colonies are of recent origin. Practically all of the infested spots so far found in Vermont were discovered during examinations of territory immediately surrounding the sites of assembling cages that attracted male gypsy moths last summer.

Satisfactory progress at heavy infestation in Connecticut.--Appreciable progress was made at the heavy gypsy moth infestation in Southbury, New Haven County, Conn., as additional workers were added to the force of men engaged in creosoting and chopping. A crew of scouts made a careful examination of the wooded area in order to determine the extent of the infestation, so that complete plans for extermination work could be formulated and applied.

Gypsy moth employees locate and mark town line.--Experienced employees of this project were recently detailed to locate and suitably mark a section of the town line between Canaan and North Canaan, in Litchfield County, Conn., which was surveyed in 1858 and where no markers whatever exist today. A reasonably accurate determination of this line seemed advisable in order that town records of gypsy moth work accomplished and infestations located and treated this year and in the future could be properly reported and recorded on the town maps.

Small infestations found in eastern part of Pennsylvania.--A gypsy moth infestation consisting of a single egg cluster was recently discovered in Lehigh Township, Lackawanna County, Pa., while scouts were examining the vicinity of two neighboring assembling cages that attracted male gypsy moths last summer. Although a very careful inspection was made for some distance around the infested spot, no further evidence of the insect was found. An infestation of approximately 30 egg clusters was located in Madison Township, Lackawanna County, in the vicinity of an assembling cage where male moths were recovered, and another gypsy moth colony was discovered in Coolbaugh, Monroe County. All of these towns are in the eastern portion of the Pennsylvania quarantined area, and they all had been previously infested.

Current C. C. C. gypsy moth work east of the barrier zone.--Several holidays during December, the return of some gypsy moth men to fire-hazard-reduction work, and the termination of an enrollment period all contributed to a gradual reduction in the number of C. C. C. enrollees available for gypsy moth work from over 2,000 6-hour man-days per week early in the month to only slightly over 860 6-hour man-days during the final week. The work done consisted of the usual control methods of scouting, creosoting, thinning, and burning brush. Several crews in Connecticut that had previously been employed on thinning work were transferred to scouting, and began an examination of territory between the known heavily infested areas and the barrier zone to determine the amount of westward spread and the degree of infestation. These crews found scattered colonies, but had discovered no heavy pockets of infestation up to the end of December. Several very heavy infestations have been located in the town of Rockingham, Windham County, Vt., where as many as 2,000 gypsy moth egg clusters are present on individual trees, and creosoting egg clusters and thinning favored food plants is being pushed in such locations. Rockingham is in the eastern section of Vermont, bordering the Connecticut River, and is not near the barrier zone; however, it is advisable to reduce such heavy infestations in order to diminish the wind spread of the small caterpillars toward the barrier zone.

C. C. C. gypsy moth report for first half of fiscal year.--During the first half of the fiscal year 1940, 25,210 6-hour man-days were used by the C. C. C. on gypsy moth work, and 40,714 6-hour man-days were taken from the planned gypsy moth program and used on fire-hazard-reduction work. Gypsy moth work was done on 21,963 acres, with thinning and rebrushing work being done on 876 of those acres. This work resulted in the destruction of a total of 312,223 new gypsy moth egg clusters. A total of 980,588 gypsy moth caterpillars and pupae were killed at burlap bands during the caterpillar season, which includes parts of 2 fiscal years.

PLANT DISEASE CONTROL

Pennsylvania farmers aid in barberry eradication.--L. K. Wright, leader in charge of barberry eradication in Pennsylvania, reports the results of local control operations in Bradford County as follows: "In the spring of 1939 Henry P. Antoine, agent, visited all farm operators in the Columbia Cross Roads area of Bradford County, outlining plans for a resurvey to destroy seedling bushes that had developed since the initial survey was completed in 1937 and 1938. Farmers in this area had experienced a marked improvement in the yield and quality of their small grains as a result of eradication work done with security-wage labor and they all expressed a willingness to cooperate in any way possible in reducing the cost of necessary follow-up work. Arrangements were made to furnish chemicals necessary to complete resurvey on each farm. In each barn or storage shed a form was posted on which was indicated the amount of salt available at that point, and provision was made for the farmers to record (1) the amount of time they gave to reinspection work, (2) the number of bushes destroyed, (3) the amount of chemical used, and (4) whether or not fruiting bushes were found. Salt was furnished for eradication work on 39 properties, and 31 of the property owners, either alone or with the help of their neighbors, completed a planned inspection of their properties. During the season 910 pounds of salt was used and 1,046 barberry bushes were destroyed. Property owners contributed approximately 4,400 man-hours of time in completing this project. This same group of farmers worked with eradication crews when the initial survey was made, thus gaining first-hand information relative to control procedure. The extent to which they are participating in the program will greatly reduce the cost of subsequent surveys that will be made to insure complete eradication on these farms and adjoining timbered properties."

Crop outlook in Missouri affected by drought.--In view of the location of grain-growing areas in Missouri with respect to those in States farther north, George M. Frandsen, leader in charge of stem rust control work in that State, has found the following information relating to the 1940 winter wheat crop outlook of particular interest. The condition of winter wheat in Missouri was reported at 68 percent of normal on December 1. This was 4 points lower than on December 1, 1938, and 16 points below the 10-year average. This condition is due to dry weather that has prevailed over the State since the latter part of August. The most unfavorable conditions were reported in the northern half of the State. The winter wheat outlook in the northwestern district is 61 percent of normal, the north-central district 62 percent, the northeastern district 67 percent, the west-central district 64 percent, and the central district 69 percent. The estimated acreage of winter wheat seeded last fall is 1,750,000. This is 7 percent below the acreage seeded in the fall of 1938 and about 11 percent below the 10-year average, 1928-37. The reduction in acreage is due largely to dry weather at seeding time and difficulties encountered in preparation of the seed bed. The figures contained in this report were furnished by the Federal agricultural statistician at Columbia, Mo.

Eighty-two-year-old survey maps reproduced.--For the purpose of developing accurate topographical maps of blister rust control areas in Oregon, it was necessary to use 52 township plats of the General Land Office. As the time allowed for use of these maps was limited, the blister rust control photographic laboratory in Spokane, Wash., was called upon to make two scale reproductions of each. With the oldest plats dated 1857, these records covered a period up to 1918, or 61 years. To complicate the problem many of the sheets were soiled, smeared, creased, and wrinkled and not a few, including all photostatic copies, had faded lines. By the process of camera copying of each plat on a 5 inch by 7 inch negative and enlargement back to the scale of 2 inches to the mile on a special insurance bromide paper used for maps, photographer H. Miller Cowling was able to produce clear and sharp reproductions. Commenting on the results, Oregon Supervisor Lyle N. Anderson stated that in all cases our copies were every bit as good as the originals and many of them seemed to be more sharply outlined and far more distinct.

Spread of white pine blister rust in 1939, summary.--During the calendar year 1939 blister rust was found for the first time on either white pine or *Ribes* in 40 counties, 9 of which are in the Southern Appalachian States and 31 in the North Central region. In the Southern Appalachian region this represents an extension of the disease to the southward on *Ribes* of 1 county in Delaware and 2 counties in Maryland. In 67 percent of the counties in the North Central region where *Ribes* infection was found, the infected host plant was *Ribes nigrum*, indicating the importance of this species in the distribution of the disease. The rust is more or less generally distributed throughout the Northeastern States on both host plants and no scouting is carried on to locate newly infected areas. Observations show that the disease continues to spread unchecked from Ribes to pines in nonprotected areas and that effective control has been accomplished in protected areas. In the Western white pine region of eastern Washington, northern Idaho, and western Montana, there was no extension of the disease reported over that known at the end of the calendar year 1938. Additional infection on Ribes was observed this year in Glacier National Park and the disease continues to spread rapidly and destructively in such young western white pine stands of northern Idaho as have not been reached in Ribes-eradication work. In the Sugar Pine region, the extended hot and dry weather and the lack of favorable winds during the period of canker sporulation appear to have checked the spread of the rust, except in the immediate vicinity of pine-infection centers, and even here infection on Ribes was relatively light, considering their high susceptibility and the volume of aeciospores produced. This is not unusual, as years in which conditions were unfavorable for rust spread have occurred in the past in other parts of the country. The results of scouting in California during the season were negative with respect to the discovery of new locations of infection on Ribes. One sugar pine was discovered along Girder Creek on the Klamath National Forest with 4 incipient cankers of 1937 origin. This infection increases the number of places where pines have been found infected in California to 3 and extends the known range of pine infection in the State to some 14 miles south of the Oregon border.

Forestry meetings held in New Hampshire.--At a series of 17 forestry meetings scheduled to be held in January in various sections of New Hampshire, the program will include white pine blister rust control, woodland management, timber-slash disposal, and forest-fire problems. A discussion of these subjects will be led by State and Federal representatives, including the district leaders in blister rust control. Mr. Newman, in charge of blister rust control work in the State, will operate the motion-picture projector at these meetings, showing pictures appropriate to the topics under discussion. The Bureau of Entomology and Plant Quarantine is cooperating with other Federal and State agencies in arranging for these meetings.

COTTON INSECT INVESTIGATIONS

Cotton resistance to thrips.--E. W. Dunnam and J. C. Clark, Stoneville, Miss., have been giving further attention to factors that influence the intensity of thrips populations in cotton and the destruction of the terminal buds. Sixteen commercial varieties and 252 pure-line selections of 12 varieties of upland cotton were examined this spring to determine whether there was any varietal resistance to thrips. Of the 16 commercial varieties studied, 8 were pilose with an average of 60 percent more hairs per square millimeter of leaf surface than the other 8 glabrous varieties. These varieties were planted early and growth was much slower than in the line selections planted later. Over 36,000 plants of the pilose and glabrous varieties were examined. The 8 pilose varieties were found to have an average of 63 percent fewer thrips per bud than the glabrous varieties but, notwithstanding this significant reduction in population, there was only 1.8 percent reduction in the number of terminal buds destroyed, which was not considered significant. Pilosity of cotton plants thus appears to be of doubtful benefit in reducing the number of terminal buds destroyed; however, the phenomena of a plant furnishing unfavorable shelter for an insect and yet suffering more damage per insect is worthy of note. The pure-line selections of 12 varieties were planted on June 2 in a field located within 200 feet of oats. When the oats were harvested the thrips no doubt migrated to the cotton. About that time the hairy vetch growing along the fence rows was also dying down. This late-planted cotton was very thrifty in the early stages of growth and was kept free of weeds which aided in holding down the thrips damage. All of the 6,784 plants examined showed severe leaf ragging and from 0.7 to 4.7 percent, averaging 2.5 percent, of the terminal buds were destroyed. In the early planted commercial varieties, where the growth was slower, as high as 39 percent of the terminal buds were destroyed, although the leaf ragging was no more severe than in the late-planted selections. Apparently one of the greatest factors determining resistance or tolerance to thrips damage to buds of cotton is the thriftiness of the plants early in the season. Other factors being equal, some varieties appear to develop stronger plants under adverse early spring weather conditions and thus tolerate greater thrips populations with no more damage to terminal buds than other varieties with less thrifty plants and lighter thrips populations.

The pH relationship of cotton-leaf-cell sap to aphids and calcium arsenate.--E. W. Dunnam and J. C. Clark, Stoneville, have been giving this subject special attention. The symbol pH, suggested by Sorensen, denotes the negative logarithm of the concentration of the hydrogen ion in gram atoms per liter. A solution having a pH value of 6 is a very weak acid but has 10 times the concentration of hydrogen ions present as in pure water which has a pH of 7. Thus, a slight change in the scale means a great change in the small units of measure. Therefore, diminishing numbers in the pH scale denotes an increase in acidity. The test was conducted under field conditions with 3 varieties of upland cotton. Two of the varieties were the same as those grown during the last 2 seasons for studies of calcium arsenate and aphid relationships. In one part of the test 4 plots were duplicated. Each plot consisted of 12 rows 121 feet long. Two varieties were grown in each plot. One plot of each variety was left undusted and the others received 3, 6, and 9 applications of calcium arsenate dust, respectively. The rate of dust application was 10 pounds per acre at approximately 5-day intervals. The first application to each variety was made July 5. The dusting schedule was completed August 15. In the second part of the test 2 6-row plots 121 feet long of 1 variety were used and 3 applications of calcium arsenate were applied to 1 plot on July 12, 17, and 24. Three times during the season 1 2½-inch disk was cut from the fourth leaf from the top, or top-zone leaves, by means of a leaf sample cutter from each of 100 plants on the 2 middle rows of each 6-row block. The total area of each 100 disk samples was 490.9 square inches. By use of a binocular counts were made of all aphids on both surfaces of leaves. After the aphids were counted the sap was pressed out by use of standard 2¼-inch-cylinder equipment and a hydraulic press with a capacity of 2,500 pounds per square inch. It was not difficult to extract from 2 to 5 ml. of cell sap from a sample, which was sufficient to take an accurate reading with a standard pH meter. As soon as all data were obtained for the sample taken near the top of plants, more mature infested, middle-zone leaves were collected and the cell sap extracted for investigation. Under the conditions of the experiment, the pH readings of sap extracted from leaves collected from undusted plants were analyzed statistically by the methods used by Snedecor, and it was found that significant differences in pH existed between Ambassador and Delfos 6, or Deltapine A and Delfos 6, regardless of the zone from which leaves were collected. The pH differences between Ambassador and Deltapine A were not significant for undusted plants collected from either zone. There was significant correlation, however, between the pH of sap expressed from both top- and the middle-zone leaves and the number of aphids per square inch of the top-zone leaves regardless of variety. The average pH of sap expressed from the top-zone leaves of the controls was higher than that for the same varieties receiving 3 applications of calcium arsenate. Apparently this lowering of pH resulted from a temporary stimulation of plant growth, or succulence, which is in agreement with plant-height records. Where as many as 6 or 9 applications of dust were applied the pH was higher for the top-zone leaves than that of corresponding controls. The pH of middle-zone leaves of each variety was higher than that of corresponding top-zone leaves. Where there was a combination of increased pH and aphid populations, a forced plant maturity occurred. Thus, there was a significant relationship between the pH readings and the number of applications of calcium arsenate. Also there was a significant positive correlation between pH readings and aphid populations following the various treatments. There were slight fluctuations found in the pH of cell sap throughout the tests, but there were definite trends for the aphid population to increase with rising pH values. On undusted plants the pH increased as the season advanced, but not as rapidly as that of dusted plants. Although there was a direct correlation between rising pH of the sap and aphid populations, some pH records among some miscellaneous tests were high with comparatively few aphids present. This would offer evidence that the reduction of sap by heavy aphid populations was not the principal reason for the increased readings. But in every case where the population was high the pH reading was high. Thus, this investigation does not explain the cause of the increased aphid populations following calcium arsenate dusting, but it does add to our knowledge concerning the reaction of the cotton plant to the insecticide and the type of medium satisfactory for rapid reproduction. Apparently the most plausible explanation of these interesting relationships would be that calcium arsenate hastens the maturity of cotton plants. The pH of cell sap rises as cotton plants mature. The biology of the aphid is apparently influenced by its host plant.

Host-plant studies of pink bollworm.--As part of the research program conducted in cooperation with the Division of Pink Bollworm and Thurberia Weevil Control, L. C. Fife, F. F. Bibby, W. D. Higdon, and J. B. Wootten have been examining the buds, flowers, and seed capsules of cultivated and wild malvaceous plants in the vicinity of Matamoros, Mexico, and Brownsville, Tex. With the light pink bollworm population in that area, cotton and okra appeared to be the only host plants of importance during the fall of 1939. Pink bollworms have not been found in any other host plants since September 15 when, as previously reported, one pink bollworm was found in a seed capsule of Turk's cap (Malvaviscus drummondii). The other malvaceous plants that have been examined during the fall of 1939 with negative results so far as the pink bollworm is concerned are: Abutilon berlandieri, A. hypoleucum, A. incanum, A. indicum, A. jacquini, A. pedunculare, A. trisulcatum; Althaea rosea; Anoda pentachista; Hibiscus mutabilis, *H. cardiophyllus*, *H. syriacus*; *Malachra capitata*; *Malvastrum americanum*, *M. spicatum*; *Malvaviscus arboreus*, *M. drummondii*; *Sida angustifolia*, *S. cordifolia*, *S. hastata*; *Wissadula amplissima*, and *W. holosericea*.

PINK BOLLWORM AND THURBERIA WEEVIL CONTROL

Field clean-up in the Big Bend.--The first step in the control program for the Big Bend area of Texas for the 1940 crop season was inaugurated during the last few days of October, when cotton-stalk destruction was begun in the Presidio area. This program was initiated following the determination by State and Federal agricultural officials that such a course was expedient in order to maintain the great reduction in pink bollworm infestation effected through the control measures applied under the "2-year plan," which was terminated with the maturity of the 1939 cotton crop. Owing to the unusual amount of rain in that area during November, the clean-up was not completed until about the middle of December; however, the most heavily infested fields were cleaned early in November before the interference of rain. The next step in this program is delayed planting of the 1940 crop, and the maintenance of a host-free period, through the elimination of all stub and sprout cotton as it develops, until most of the pink bollworm moths emerging in the spring have perished because of the absence of a host on which to perpetuate themselves. Similar control measures for suppression of the pink bollworm are again being employed in the Big Bend area on the Mexican side of the Rio Grande, in the Ojinaga region. Cotton in that area was a little later than on the American side, necessarily retarding the cleaning of fields. Consequently, the greater part of the clean-up in that area was done in December.

Destruction of soca cotton and random plants in south Texas.--Following the completion of the stalk-destruction program in cottonfields planted in 1939, contacts with growers were intensified to encourage the destruction of seedling and sprout plants, which developed after fields had been accepted as being in compliance. Most farmers gave good cooperation in this respect, many recleaning their fields for the third or fourth time. During the early part of December, however, this being the busy season in the lower Rio Grande Valley area for the preparation of land for vegetable crops, growers began neglecting their cottonfields, and expressed the feeling that continued stalk-destruction work constituted a considerable hardship. A systematic check was therefore begun of all fields planted in 1939, as well as soca and abandoned acreage, and it was found necessary to rework all fields with Bureau labor in order to destroy cotton that might become a menace prior to the maturity of the 1940 cotton crop. Good progress was made in this work during December, and it is felt that the thoroughness with which this operation is being accomplished, on account of Bureau funds available for this work, should show favorable results in the degree of infestation in the 1940 cotton crop.

Plans for the 1940-crop season in south Texas.--A meeting for the purpose of determining the future course to be pursued in efforts to control and eradicate the pink bollworm from south Texas areas was called by Lee A. Strong on December 15, at San Antonio, Tex. This meeting was attended by Federal and State agricultural officials from practically all of the cotton-growing States, as well as by many cotton growers, processors and other interested persons from south Texas regulated areas. The assembly was unanimous in expressing the desire for the continuation and intensification of assistance of Federal and State agencies as applied during the last year. Following the meeting, resolutions were passed to the effect that every effort would be made by south Texas delegates to obtain an adequate appropriation from Congress to continue and intensify the fight against the pink bollworm in that area for the coming year. In response to the expressed desire of growers in that area to institute a more intensive program for the 1940 crop season, the State Department of Agriculture issued an order on December 26, establishing the planting period for cotton in the lower Rio Grande Valley counties between the dates of February 20 and April 1, thus shortening the growing period for cotton and creating a more favorable host-free period. Also, as an added precaution against the possible spread of the pink bollworm from the lower valley area during the coming season, a proclamation was issued by the State commissioner the latter part of December providing for the sterilization of cottonseed as a continuous process of ginning in the counties of Cameron, Hidalgo, Willacy, and Starr, referred to as the lower valley counties. At a meeting of farmers in the Matamoros area of Mexico during the latter part of December, the assembly was unanimous in requesting that the planting period be fixed between February 20 and March 20 for the heavily infested area of the lower Rio Grande Valley of Mexico.

Gin-trash inspection.--Inspection of gin trash is carried on each year throughout the harvesting season in the various areas at the most effective periods for determining the degree of pink bollworm infestation in known infested areas, as well as for locating incipient infestations outside regulated areas. Gin-trash inspection for the 1939 crop season was brought to a close around the middle of December with the completion of operations in Arizona. A comparatively heavy pink bollworm infestation was found to be present in the Glendale area of Maricopa County. No infestation was determined in that section last year, and no suppressive measures were applied. Infestation was determined to be considerably lighter in all other known infested areas in the Arizona district. At the close of December plans were being made to begin clean-up operations on approximately 3,000 acres of cotton land in the Glendale section of Arizona early in January.

Thurberia-plant eradication.--The Thurberia-plant-eradication program, as designed and initiated in 1935, was for the purpose of removing Thurberia plants from the western slopes of the Santa Catalina Mountains and from the entire range of the Tortillitas in Arizona. Thurberia plants existing in these mountains are infested with a weevil which attacks cultivated cotton and, consequently, constitute a dangerous threat to domestic cotton plantings throughout the Santa Cruz Valley. The removal of plants from these ranges is now fast drawing to completion. The Tortillitas have been gone over twice, and on the second coverage very few plants were found, as compared to the original number removed. It is now planned to reenter the western slopes of the Catalinas late in January for the purpose of rechecking that mountain range.

Wild-cotton eradication in Florida.--The pink bollworm was discovered in domestic cotton plantings in northern Florida in 1932, having spread there from wild cotton in southern Florida. Consequently, during that same year, an effort was begun to eliminate wild cotton from a very considerable area along the west coast of Florida and numerous keys along the southeast coast. During December, 12 W. P. A. crews and 2 Bureau crews were engaged in wild-cotton-eradication activities. At the close of the first week in December approximately 200 C. C. C. enrollees were received at the camp at Cape Sable, established by the Army and Forest Service for the purpose of aiding in wild-cotton eradication in that area. Approximately 90 of the total number of enrollees were available for actual plant-destruction work, and this activity was begun on December 11. Others were assigned to road work and camp maintenance. Owing to the C. C. C. men being entirely unfamiliar with this type of work, and also to disruption caused by the holiday season, considerable trouble was experienced during the first few weeks in efforts to bring the eradication work up to a higher standard of efficiency. Toward the close of the month there was discernible improvement in the performance of the work, and a greater amount of acreage per man-day was being cleaned. The number of wild cotton plants being found in the Cape Sable area this season is considerably less than in the same sections last season, the ratio being approximately 100 to the acre last year as compared to about 80 per acre this season. In all other south Florida areas where wild cotton is being eradicated, very few mature plants are being found, and a comparatively small number of seedlings is being found in most areas.

TRUCK CROP AND GARDEN INSECT INVESTIGATIONS

Cauliflower, dusted before flower-forming, escapes excessive residues.--C. E. Smith and R. W. Brubaker, of the Baton Rouge, La., laboratory, report that the marketed portion of crops of cauliflower dusted at approximately 10-day intervals up to the time when flowering began, using a dust mixture composed of 19 parts of calcium arsenate and 1 part of paris green, by weight, directed against several species of common cabbage caterpillars, did not bear a residue equaling the legal tolerance of 0.01 gram of AS_2O_3 per pound. The last application of the arsenical mixture was made on November 15 and samples for analysis were harvested on December 6 and 13. Over 2 inches of rainfall occurred between the last dusting and harvesting, a period of approximately 3 or 4 weeks. During the flower-forming and harvesting period, the crops were protected with applications of a dust mixture containing 1 percent of rotenone. The principal species of cabbage caterpillars attacking the cauliflower in these tests were the cabbage looper, the imported cabbage worm, the diamondback moth, and the cross-striped cabbage worm, as well as several species of Agrotinae. The indicated schedule of arsenical and rotenone-containing dust mixtures protected the cauliflower plants from the above-mentioned species of caterpillars so that the marketability of the crop was not affected adversely.

Survey made to determine status of ships, railroad cars, and auto trucks in dissemination of stored-tobacco insects.--As the result of a survey made by L. W. Brannon, of the Norfolk, Va., laboratory, during the period October to December 1939, to determine the role of ships, railroad cars, and auto trucks in disseminating stored-tobacco insects, principally the tobacco moth and the cigarette beetle, it was found that none of these insects were present on any of the 70 ships loading export tobacco examined, although in many instances materials such as tapioca flour, cacao beans, copra, pepper, peanuts, dried figs, raisins, and currants, which might serve a diluent caused foliage injury. Results with and without hoods were not sufficiently consistent to enable the determination as to whether the use of these mechanical aids to the application of dust mixtures on beans is warranted.

Potatoes following alfalfa in different crop-rotation series show least damage to tubers.--In checking the results obtained in different crop-rotation series at Prosser, Wash., K. E. Gibson, of the Walla Walla, Wash., laboratory, found that the least damage to potato tubers from wireworms, principally the sugar beet wireworm (Limonius californicus Mann.) and L. canus Lec., the Pacific coast wireworm, occurred in plots which followed alfalfa of previous years, and that these plots also contained, on an average, the lowest wireworm populations. Furthermore, the finest grade of potatoes were harvested from the plots that followed alfalfa, irrespective of wireworm damage in those plots. The highest degree of damage to the 1939 crop of potatoes in these plots occurred in the rotations where potatoes followed wheat or potatoes of the preceding year. In classifying the rotation series into six groups, on the basis of the crops that preceded the 1940 potato crop, the following data were obtained:

Potatoes following	Average wireworm population per square foot	Average total damage
	Number	Percent
Alfalfa	1.4	18.66
Sweetclover	1.6	52.24
Sugar beets	3.6	60.51
Corn	4.8	57.54
Potatoes	5.2	69.15
Wheat	7.6	63.69

INSECTS AFFECTING MAN AND ANIMALS

Field tests on natural screwworm cases.--Henry E. Parish and Edward F. Knipling, of the Menard, Tex., laboratory, report: "Field tests were conducted on nine selected ranches in Menard and Kimble Counties, Tex., during 1938 and 1939. Results of tests with pine-tar oil, diphenylamine, p-nitrophenetole, diphenylene oxide, and a mixture, diphenylamine 95 percent and calcium stearate 5 percent, are presented. Tests in 1938 with pine-tar oil and diphenylamine showed diphenylamine to be several times more effective as a wound protector than was pine-tar oil. Tests in 1939 showed diphenylamine to be the most effective wound protector tested. Owing to cost, p-nitrophenetole, although slightly more effective than diphenylene oxide, was eliminated. Although slightly less effective than diphenylamine, this material may be a practical treatment in screwworm control, because of its low cost and because of its advantage over diphenylamine in that it does not cake upon exposure to high temperatures. The addition of calcium stearate to diphenylamine for the purpose of preventing caking decreases the effectiveness of diphenylamine as a wound protector."

Gulf coast tick control; laboratory tickicide tests.--A. L. Brody, of the Panama City, Fla., laboratory, reports the following: "A simple method of testing the toxicity of chemicals to the Gulf coast tick was devised.

as sources of insect infestation, were found in bulk or scattered about in the holds of ships in which tobacco was loaded, or in adjoining holds on the same ships. On the other hand, practically all of the imported tobacco examined during the survey was infested with both the tobacco moth and the cigarette beetle, the infestation being quite heavy in most instances. It was found that two or three types of imported tobacco were often placed in the same hold of the ship, thus subjecting noninfested tobacco to the dangers of infestation in transit. Also, in some instances American tobacco for export was loaded in ships' holds from which heavily infested imported tobacco had just been removed. In such cases, and even though such American tobacco had been fumigated prior to export, it could hardly escape reinfestation in transit. The survey with reference to imported tobacco indicates that all such types of tobacco may be a means by which large numbers of these moths may enter with the tobacco. Out of a total of 146 railroad cars inspected during the survey, 9, or approximately 6 percent, contained living stages of _Ephestia_ _elutella_ Hbn. The inspections indicate that during October and the early part of November, when the temperature is favorable to the activity of _E._ _elutella_, many adults may enter the railroad cars at the point of origin and be transported to the storage warehouses along with the tobacco shipments. This type of carrier apparently offers an excellent means of developing new infestations in noninfested storage houses, or of causing reinfestation in fumigated warehouses. No stages of the tobacco moth or cigarette beetle were found during an examination of 59 auto trucks during the course of this survey.

Relative value of different sprays and dusts against Mexican bean beetle.--During the course of insecticide tests against the Mexican bean beetle, N. F. Howard and R. H. Nelson, of the Columbus, Ohio, laboratory, found that sprays composed of cube, timbo, or derris, containing 0.01 percent of rotenone, were almost as effective as sprays containing cube which contained 0.015 percent of rotenone, and that no outstanding nor consistent differences were apparent in the efficiency of the sprays derived from the three different sources of rotenone. In these series of tests the spray composed of cube containing 0.015 percent of rotenone was used as a standard of comparison, since it gave consistently good control of the insect. The addition of bentonite and vegetable oil to sprays composed of cube and containing 0.01 percent of rotenone did not improve the toxicity of such sprays to the insect nor increase the insecticidal effect. Sprays composed of cube containing 0.02 percent of rotenone combined with Bordeaux (4-6-50) 2 months before they were used, retained their toxicity and were highly effective against the Mexican bean beetle. Nicotine-bentonite sprays showed no promise against this insect. Four paris green homologues prepared by F. E. Dearborn, of the Division of Insecticide Investigations, in 1938 and consisting of peanut-oil green, sulfurized peanut-oil green, corn-oil green, and sulfurized corn-oil green, to all of which sodium lauryl sulfate was added as a wetter and spreader, were strongly phytotoxic. Phenothiazine alone and phenothiazine-AS_2O_3 gave a fair degree of control but foliage injury was noted, especially when the phenothiazine was used alone. A dust mixture composed of cube and talc, containing 0.5 percent of rotenone, was effective. A dust mixture composed of derris and talc, containing 0.5 percent of rotenone, appeared superior to a dust mixture containing 60 percent of sodium aluminum fluoride with talc as a diluent, when used with a power duster. A dust mixture containing sulfur nitride with talc as

Although the data are insufficient to warrant definite conclusions, many interesting data were obtained. Diphenylamine, pyrethrum powder, derris powder, and nicotine were lower in toxicity than was pine-tar oil. Thymol, eugenol, and oil of cloves were quite toxic when tested alone. Combined with pine-tar oil or a paloja and lanum mixture, the toxicity of these chemicals fell. Dinitrothymol, on the other hand, retained its toxicity even in combination."

Rearing of dog fly, or stablefly.--Mr. Brody also reports that the dog fly, or stablefly (*Stomoxys calcitrans* (L.)) has been successfully reared in a medium of marine algae of the genus *Sargassum*, but flies emerging from this were abnormally small and died without ovipositing. The mean duration of the larval period of four cages of *Stomoxys* reared on *Sargassum* was 20.5 days, and the mean pupal period for specimens of two different cages was 7 and 8 days, respectively. To date, larvae have apparently failed to develop in a medium composed of *Ruppia maritima longipes* and *Zostera marina*. Some breeding has been found, however, in this material in the field.

Comparative toxicity of larvicides.--H. H. Stage, of the Portland, Oreg., laboratory, reports that in a study of the comparative toxicity of several larvicides to larvae of *Culex*, *Aedes*, *Theobaldia*, and *Anopheles* it was found that *Culex* and *Anopheles* appeared to be more susceptible to phenothiazine than were *Aedes* and *Theobaldia*. Benothiazole gave poor kills against *Culex*, *Aedes*, and *Theobaldia*. *Culex* showed the greatest resistance to floatable paris green and *Anopheles* were the easiest to kill with it. *Anopheles* showed a strong resistance to pyrethrum. Nicotine gave poorest kills against *Theobaldia*. In general, *Aedes* were the least resistant, *Culex* next least resistant, and *Theobaldia* the most resistant. In general, it was found that larvicides toxic to mosquito larvae were about in the same degree toxic to most aquatic insects. Dragonfly nymphs were more resistant than damsel fly nymphs. Pyrethrum emulsions applied at a rate as high as 35 gallons per acre of water surface were not toxic to amphibia nor fish, whereas diesel oil at the rate of 25 gallons per acre was particularly toxic.

Effect of increasing photoperiod on activity of American dog tick.--C. N. Smith, of the Vineyard Haven, Mass., laboratory, reports that studies on the effect of an increasing photoperiod on the activity of *Dermacentor variabilis* (Say), as indicated by readiness to engorge, showed adults to be unaffected, larvae markedly affected, and nymphs more markedly affected than were the larvae.

Studies of mosquito larvicides.--W. V. King, of the Orlando, Fla., laboratory, reports as follows: "Forty-one compounds were tested to determine their relative toxicity to larvae of *Culex quinquefasciatus* Say. Of these, 30 were new in the present study. The 3 most toxic of the organic materials other than azo compounds were: p-iodophenylester of thiocyanic acid, p-bromophenylester of thiocyanic acid, and dibenzothiophene. The results obtained with azo compounds were of special interest, inasmuch as 13 of the 18 materials of this group that have now been tested have shown a high degree of toxicity at less than 10 p. p. m. A series of comparative tests was carried out with 9 of the more toxic compounds and from these it was concluded that, in acetone solutions, 2 of the group were more toxic than phenothiazine, while 3 others were at least of about equal toxicity. Seven cadmium compounds were tested and proved to be low in larvicidal value. None gave complete mortality at 100 p. p. m. Mixtures of 2 organic compounds in equal proportions were tested but the results gave no indication of synergistic action between any of the 8 materials included in various combinations in the series. On the other hand there was some indication that diphenylamine caused a reduction in the effectiveness of the compounds with which it was mixed. The use of penetrol with 5 organic compounds failed to increase their effectiveness. In most cases the larval mortality was actually reduced, which is in marked contrast to the effect of this oil on phenothiazine. The mortality produced by several organic compounds was higher when the solutions were diluted in distilled water than when tap water was used. These results may have been related to the difference in pH values of the 2 waters. Phenothiazine was found to act as a contact poison on Culex pupae, particularly in solutions containing penetrol. Acetone solutions of 4-(p-bromophenylazo)-m-cresol had little effect on the pupae."

Water condition and plant associations in relation to mosquito breeding.--G. H. Bradley and B. V. Travis, of the New Smyrna, Fla., laboratory, have presented a summary of the field studies made in Volusia County during the last season on a series of salt-marsh stations where weekly records were made as to water conditions and mosquito breeding. Special attention was given to methods for determining the relative and total seasonal production of salt marshes as a statistical basis for comparing the importance of different areas. Larval abundance on these stations was found to be highly correlated with the presence of the salt-marsh grass Distichlis spicata. On 1 station representing this type of plant growth, 10 larval broods were recorded out of 20 weekly observations made during the season, and the total seasonal production for this marsh was estimated at about 46 million larvae per acre. The next heaviest production occurred on a marsh overgrown with spike grass (Juncus roemerianus), which produced 8 broods for an average of 30 million larvae per acre. The lowest production occurred on a station where the 2 species of bunch grass (Spartina bakeri and Fimbrystalis castaneae) were dominant, the average production here being less than 1 million per acre. This last type of growth as a rule occurs in low marshes having a low average salinity.

Stimuli for hatching of salt-marsh mosquito eggs.--Messrs. Bradley and Travis also report that water infusions of several species of salt-marsh plants were found to be effective as hatching stimulants for eggs of Aedes taeniorhynchus (Wied.) and A. sollicitans (Walk.). This was likewise true with solutions containing asparagine and sodium biphosphate in the proportions reported as effective for the flood-water mosquitoes of the Northwest. In the tests described here the hatchings obtained with the asparagine solutions were approximately equal at all concentrations ranging from 0.008 to 0.125 gram of asparagine per liter. Higher concentrations proved to be more or less harmful to the eggs or young larvae.

FOREIGN PLANT QUARANTINES

Important interception at New Orleans.--An examination of a lot of 30 pounds of green string beans originating in Brazil, found in the vegetable chill room of the Japanese M. S. *Yamazato* arriving at New Orleans recently, showed approximately 50-percent damage by the larvae of two species of Lepidoptera. Judging from the number of specimens found, the larvae of *Maruca testulalis* (Gey.) were responsible for two-thirds of the damage, while those of *Epinotia opposita* Hein. caused the remainder. In several pods the larvae of both species were found together and the injury caused by each was identical. The larvae of *Epinotia* were all alive and quite active, while those of *Maruca* were either dead or in a comatose condition, due possibly to the low temperature maintained in the chill room. Apparently this is the first record of the occurrence of *Epinotia opposita* Hein. from Brazil.

Cooperation from passengers at Norfolk.--Two passengers from Panama, disembarking from an American intercoastal steamer at Norfolk, Va., recently, had their baggage placed on the dock for the usual customs inspection in the presence of a plant-quarantine inspector. All baggage was found in proper order except one item resembling a coat hanger, covered with paper folded in the shape of a woman's large purse. Inside the paper cover were found seven orchid plants on a piece of limb about 1 foot long, suspended from either end with wire. The passenger, having no special permit, willingly turned the entire outfit over to the plant-quarantine inspector for inspection and destruction. An interesting phase of the interception which should be mentioned was that the passenger who had the plants was "on the spot," owing to the fact that the other passenger, when questioned about plants or plant products in his baggage, replied in the negative but told the inspector he had better talk to his fellow-passenger about this subject.

Dixie Clipper brings pests into port.--When the Pan American Airways seaplane *Dixie Clipper* arrived at Port Washington, Long Island, N. Y., on November 23, 1939, from Lisbon, Portugal, the Azores, and Bermuda, 2 bouquets from Bermuda were abandoned. One bouquet consisted of 15 chrysanthemum cuttings and the other of three gladiolus cuttings and 30 jasminum cuttings. The following interceptions were made from the chrysanthemum cuttings: *Septoria chrysanthemella* Sacc., *Frankliniella insularis* (Franklin) (adults), *Haplothrips gowdeyi* Franklin (adults), *Orius insidiosus* (Say) (Anthocoridae), *Macrosiphoniella sanborni* (Gill.), *Polia* sp.? (Noctuidae), *Homoeosoma* sp.? (Phycitidae), and a sp. of Geometridae. From the gladiolus cuttings, the following interceptions were taken: *Laphygma frugiperda* (A. & S.) and *Frankliniella insularis*. One of the passengers had some bottles of liquor on which were wheat, rye, and oat straw jackets from Portugal. *Puccinia graminis* was intercepted on the wheat straw.

Inspection notes from San Francisco.--During the inspection of passengers' baggage on the S.S. *Lurline* arriving from the Hawaiian Islands, a single sprig of Island cotton, picked by the owner as a souvenir, was intercepted in a suitcase and on inspection was found to carry four live larvae of the pink bollworm (*Pectinophora gossypiella* Saund.). Three species of injurious snails, viz.: *Cochlicopa lubrica*, *Carychium minimum*, and *Polita* sp., new to our fauna, were intercepted infesting a single shipment of rhododendron plants from England.

Inspection notes from San Pedro.--While inspecting baggage being removed from a tanker from Hawaii, a member of the crew became panicky and confessed to having 6 papayas in his possession. This violation was taken up with officials of the Oil Company who promised to take suitable steps to correct the situation. While inspecting cargo discharged from the liner *Matsonia* from Honolulu, a package of jam was found to have a small box of fresh Hawaiian peppers secreted therein, a potential host of the melonfly. A shipment of 20 cases of cipolline (grape hyacinth) bulbs from French Morocco were found to harbor several live snails known as *Helix lactea*, a closely related species to *Helix pisana*. The entire lot was hand-picked and 20 snails were removed and destroyed.

Eagles infested.--While inspecting the baggage and personal effects of a passenger who arrived at the port of Seattle from Japan on October 4, 1939, Inspector C. V. Scott found three eagles to be infested with insects. The insects were not *Mallophaga* but the bostrichid *Dinoderus minutus* Fabr., for the eagles were of wood, beautifully carved from bamboo. The eagles were bound together with braids of rice-straw rope, which of itself carries a pest risk because of the frequency with which unprocessed rice straw from the Orient is found to be infested with the destructive Asiatic rice borer (*Chilo simplex* Butler).

Entomological interceptions of interest.--Eight living larvae of the dark fruitfly (*Anastrepha serpentina* Wied.) were intercepted at New Orleans on September 7, 1939, in a sapote fruit in passenger's quarters from Honduras. A living adult of the mordellid *Naucles pusio* (Lec.) was taken at El Paso, Tex., on June 27, 1939, on a rose flower in baggage from Mexico. A living specimen of the mirid *Orthotylus virens* (Fall.) was intercepted at Detroit, Mich., on August 24, 1939, on cut heather in the mail from Scotland. A living larva of the phycitid *Moodna bisinuella* Hamp. arrived at Eagle Pass, Tex., on August 22, 1939, in an ear of green corn in baggage from Mexico. A living adult of the scarabaeid *Genuchinus velutinus* Westw. was found at Charleston, S. C., on September 5, 1939, on a banana leaf in cargo from Guatemala. A living larva of the elaterid *Brachylacon murinus* L. was intercepted at New York on August 3, 1939, in a peony root in baggage from Yugoslavia. A living adult of the cerambycid *Drycothaea sallei* Thoms. was found at Baltimore on August 14, 1939, with bananas in cargo from Honduras. A living larva of the tenebrionid *Alegoria dilatata* Cast. arrived at Boston on October 12, 1939, on a banana leaf in cargo from Honduras. Six living larvae of the otitid *Eumecosomyia nubila* Wd. were taken at Laredo, Tex., on September 15, 1939, in green corn in baggage from Mexico. A living specimen of the lygaeid *Heraeus cincticornis* Stal was intercepted at Washington, D. C., on October 10, 1939, with wild orchids (*Cattleya*) in cargo from Venezuela.

Correction.--In the News Letter dated December 1, 1939 (v. 6, No. 12, p. 28, line 4) the note should have stated that "living specimens of *Kakothrips robustus* (Uz.) were intercepted at New York on July 3 on pea pods in ship's stores from the Netherlands," and not "from Italy."

Pathological interceptions of interest.--Plant-disease determinations received during the month included *Bacterium citri* Doidge on pomelo from Straits Settlements taken at Philadelphia December 21; *Colletotrichum macrosporum* Sacc. on *Cymbidium finlaysonianum* from Philippine Islands at San Francisco on August 21; *Cytospora ambiens* Sacc. on chestnut bark on many hoops in cargo from Italy on November 29 at New York; *Erysiphe polygoni* DC on *Cuminum cyminum* seed from Malta on November 17 at New York; *Fusicladium depressum* (B. & Br.) Sacc. on fennel seed from Italy on September 27 at New York; *Fusicoccum quercinum* Sacc. on oaks from Germany on April 20 at Washington; *Gloeosporium crocatum* Sacc. on *Pedilanthus* sp. from Mexico on July 19 at San Francisco; *G. odontoglossi* var. *macrospora* Verpl. on *Odontoglossum* spp. from Colombia on July 15 at San Francisco; *Gloeosporium* sp. (no species reported on host) on *Caralluma* sp. from Portuguese East Africa on June 20 at San Francisco; *Hendersonia* (*donacis* Sacc.?) on *Arundo donax* canes from Palestine on September 8 at New York; *Ijuhya vitrea* Starb. on *Aglaonema* canes from China on April 14 at San Francisco; *Myxosporium* sp. (no species reported on host) on *Euphorbia* sp. stem from Straits Settlements on May 3 at New York; *Nectria binotiana* Sacc. on *Phalaenopsis* sp. from France on June 1 at Washington; *Phoma* sp. (unlike species known to occur on host) on *Euphorbia* sp. from Portuguese East Africa on June 20 at San Francisco; *Phomopsis prunorum* Grove on *Prunus laurocerasus* stem from France on May 8 at New York; *Phyllosticta nigromaculans* Sacc. on orchid from Mexico on October 30 at Brownsville; *P. stanhopeae* All. on *Stanhopea* sp. from Mexico on September 12 at San Francisco; *Phyllosticta* sp. (possibly *P. danoes* but no material available for comparison) on *Ruscus* sp. from Italy on May 11 at New York; *Physalospora rosicola* Sacc. on various rose varieties from Australia on July 17 at San Francisco; *Sclerotinia* spp. on narcissus bulbs from Holland in various shipments during the season at New York; *Septoria caricis montanae* Vestergren on *Carex montana* from Sweden on June 26 at New York; and *Vermicularia* sp. (no species reported on host) on *Caralluma* sp. from Portuguese East Africa on June 20 at San Francisco.

DOMESTIC PLANT QUARANTINES

Crops protected in grasshopper-control program.--For each dollar spent for the purchase and mixing of poison bait in the grasshopper-control program in 1939, $52 was saved in crops protected, according to estimates of State leaders in the control campaign. Nearly 57,000,000 acres of crops, having a value of over $128,000,000, were protected by the Federal-State bait-spreading operations, and 235,000 farmers spread 153,600 tons of bait, dry weight. It is believed that the plan of operation this year of dividing the work according to the two types of problems involved, that of (1) crop hopper infestations of the Western States, and (2) areas infested by species with migratory tendencies in both the northern and the southern parts of the Great Plains, brought about the correction of errors in operations of the previous year. In the southern Great Plains area, baiting on the hatching grounds of the long-winged migratory species and, later in the season, baiting of adults congregating for egg-laying purposes, reduced their numbers to a very low point. In the northern Great Plains area, all details were arranged with the local leader in each township well in advance of the bait-spreading season, so that the program moved along with surprising efficiency. County lines were disregarded and special attention was given to idle and abandoned land and depleted range. This procedure necessitated participation by the Bureau, and included bait materials, labor, spreaders, distribution of bait, and the use of airplanes over areas that could not be reached by other means of baiting. The actual baiting season lasts only about 40 days, and only portions of the day are suitable for spreading bait, therefore, it was surprising to farmers to see just how systematically and efficiently the work in the areas infested with the migratory species could be accomplished. In the crop-hopper areas the county agents were responsible for leadership and they conducted the most successful program this year ever accomplished for crop protection.

More about the results of Mormon cricket control.--It is estimated that nearly 1,250,000 crop acres were protected in the Mormon cricket control operations of last field season, conducted jointly with the States and other cooperators, in 65 counties in Idaho, Montana, Nebraska, Nevada, Oregon, South Dakota, Utah, Washington, and Wyoming. This estimate is based on observations of State and local supervisors, and it is believed to give a fairly representative picture of the existing situation. Damage to cultivated crops by the crickets was held to a minimum in all areas of the region. Although the percentage of injury to all crops in the region showed a higher average than in 1938, the crop losses of slightly over 6,000 acres were half that of the previous year. The destruction of range lands likewise was reduced 50 percent in acreage. Such losses, however, totaled over 960,000 acres in 1939. The most important development in the work of the past season, it is believed, is the further swing away from hand dusting to power dusting, which is mainly responsible for dusting nearly 51,000 acres more than in 1938, at a cost per acre of $1.54, as contrasted with $2.15 per acre in 1938.

Chinch bug survey.--In consideration of the unusually large number of chinch bugs which appeared in the summer and fall of 1939 in certain sections of Ohio, Indiana, Illinois, Missouri, Iowa, Nebraska, Kansas, and Oklahoma, a survey of such infestations was made by the Bureau jointly with the affected States, to determine the possibility of these insects occurring in outbreak numbers in 1940. This work, which was completed in a 5-week period ended about December 15, indicates that, in the absence of unfavorable climatic conditions or other influencing factors during the coming months, outbreaks of chinch bugs may be expected in all the above States. Areas that show indications of infestations of a heavy or severe degree extend from the eastern parts of Nebraska, Kansas, and Oklahoma, through large portions of Iowa, Missouri, and Illinois, a considerable portion of Indiana, and a somewhat lessened area in Ohio. Infestations of a light or threatening type are also recorded throughout the region. State pest-control officials estimate that 10,646,000 gallons of creosote may be needed for the control of these pests in 1940. A total of 4,761 samples was taken in the 8 States. The samples consisted for the most part of big bluestem, little bluestem, and broom sedge. The survey was conducted in 432 counties. In estimating the needs, consideration was also given to the acreage of corn or other cultivated crops in each county.

Some results of peach inspection work.--Inspections for the phony peach and peach mosaic diseases were made in 1939, cooperatively with the States, in 22 States from the Atlantic to the Pacific coast. Over 188,000 properties were inspected. The mosaic disease was found infecting over 64,000 peach trees. The new cases, however, numbered less than 25,000, a reduction of approximately 9,000 since 1938. In the areas regulated under peach mosaic quarantines of the affected States, inspection was made of 264 nurseries and 258 budwood properties, and also of all areas within a 1-mile zone of such nurseries and budwood sources. Twelve percent of the nurseries and 8.5 percent of the budwood sources failed to meet certification requirements. Nurserymen were immediately advised of conditions as to the budwood properties, in order that other selections might be made. Nurserymen strongly endorsed this action as a service toward growing better nursery stock. The inspection of dealers' sales' grounds resulted in finding that 9 of the total of 117 failed to meet certification requirements.

Nursery inspections for phony peach disease.--In the phony peach area all nurseries growing peach stock, a total of 664, were found to fulfill the conditions for shipping interstate. The 716 phony trees found in the environs of these nurseries were removed prior to June 30, in compliance with the standardized provisions of State quarantines. This is the second consecutive year in which all nurseries in the area have met the certification requirements. When it is considered that the 664 nurseries are located in 15 States, and are growing 26,000,000 peach trees, the percentage of trees found to be infected with the phony peach disease within the radius of a mile of the nursery is trivial indeed. The finding of the 716 infected trees necessitated inspection of trees on 27,800 properties.

Survey for larvae of white-fringed beetle.--An intensive survey for larvae of the white-fringed beetle is being made in several infested areas in order to determine the relative effectiveness of control measures. Several 160-acre tracts where infestations are abundant have recently been selected in Mississippi and Alabama for observation. In this work, larvae were found at Meybank, Miss., numbering 57.3 to the square yard in cultivated fields, and 6.3 to the square yard in woodland. In 5 areas a survey of larvae of both species of the beetle gave the following results:

Type of land	Larvae per square yard
	Number
Treated cultivated land	6.2
Untreated cultivated land	50.3
Treated woodland	2.7
Untreated woodland	8.6

Land cleared for control of white-fringed beetles next season.--Making ready for dusting and spraying work when the conditions are right for such operations, relief-labor crews are being employed in clearing infested woodland of brush and debris. During December over 400 acres were cleared at Florala, Monroeville, and Mobile, Ala., and Pensacola, Fla.

Nursery work at New Orleans.--Nurserymen and florists in New Orleans are continuing to install plunging beds and barriers recommended for preventing natural infestation by white-fringed beetles, and to arrange for the sterilization of their soil. Out of 1,916 calls made by State and Federal inspectors at New Orleans in December, 1,023 were for the purpose of checking certified units, checking the receipt of plant shipments, and explaining requirements for maintaining a certified establishment.

The sweetpotato weevil situation.--Active infestations of the sweetpotato weevil have been reduced to 428 in the areas in Alabama, Georgia, Mississippi, and Texas, in which eradication of these pests has been undertaken jointly with the States since July 1937. An infestation is considered active if weevils have been found on the property within a 12-month period. In Georgia active infestations within the eradication area have been reduced from 70 in 1937 to 20 in 1939.

Transit inspection in the Northeastern States at the Christmas shipping season.--In preparation for checking the movement of Christmas greenery from the gypsy moth area, special tours of inspection were drawn up and the 11 full-time transit inspectors in that region were assisted by 8 additional inspectors assigned by the Japanese beetle-gypsy moth quarantine enforcement projects. This assistance made possible a force of 8 inspectors at New York, 4 at Boston, 3 each at Philadelphia and Pittsburgh, and 1 at Springfield, Mass. The tours of these cities were so arranged as to permit of as thorough and coordinated a check as possible of material from the gypsy moth area by mail, express, freight, truck, and boat. In metropolitan New York, the mail and express terminals were covered 24 hours daily. Freight stations and piers were checked at opportune times. Carlot shipments of Christmas trees were examined at the New York, Philadelphia, and Pittsburgh terminals, and 585 cars were checked. Of the cars arriving in New York City, 92 percent were of Canadian origin and 8 percent were from New England. At Pittsburgh, however, shipments of New England Christmas trees constituted 72 percent of the arrivals. All carlots of trees examined from the gypsy moth area were properly certified. Although the large number of shipments of the home type, which had been certified at origin in conformity with quarantine regulations, attracted the attention of inspectors at all stations, the infringements of quarantines found in the Northeastern region in December totaled 483. These were consigned to 39 States, the District of Columbia, the Canal Zone, Puerto Rico, and Canada. About 91 percent of these infringements involved the gypsy moth quarantine. Most of the materials were of the type that could be inspected in transit and certified by the transit inspector.

Interceptions of interest.--At Boston 2 well-concealed shipments of evergreen cuttings were found in crated furniture, 1 air-express interception was made, and 40 shipments of boxwood corsages which had been consigned by 1 shipper to dime stores in 35 cities in 14 States and the District of Columbia, were intercepted. At New York several uncertified commercial shipments were caught which bore false labels as to contents, or were marked, "Not subject to inspection."

Transit inspectors of Central States hold meeting.--A conference of transit inspectors was held in Chicago on December 18 and 19, attended by inspectors from Washington, Cincinnati, Kansas City, Omaha, St. Louis, and Chicago, as well as by two Post Office Department inspectors, a representative of the Civil Service Commission, and a port inspector, all of whom participated in the program. J. M. Corliss, transit inspector in charge of the Central States region, presided at the meeting. An open discussion of problems that confront inspectors at the respective stations proved instructive in presenting various phases of the work with which the less experienced inspectors were not familiar. The necessity for conducting a survey of break-bulk houses located on all freight railway lines was agreed upon, and the mechanics of working out such a program were set up. A further study of mail and express trains was also worked out in order to coordinate the inspection of shipments. A method of keeping inspectors better informed of the program of work at other stations was arranged.

Tennessee makes provision for blister rust control areas.--Under a quarantine adopted by the Tennessee State Department of Agriculture on December 13, 1939, the commissioner is authorized to designate as blister rust control areas any areas in that State in which he determines that five-leaved pines, including those to be grown in a nursery or planted for reforestation, should be protected from white pine blister rust. All currant and gooseberry plants growing in any blister rust control area are subject to destruction. The quarantine further provides that five-leaved pine trees may be destroyed when *Ribes* in the vicinity are of more value than the pines, or when the cost of removal of the *Ribes* within the infective range would be greater than the value of the pines.

The citrus canker situation.--The citrus canker eradication project presents an encouraging situation in that no cases of the disease have been located in Texas for the last 16 months. Searching in December for canker on 18 properties on which considerable difficulty has been experienced with recurrent infections since 1935, inspectors were unable to find any indications of the disease. On 11 such properties in Brazoria County, only 13 small *Citrus trifoliata* seedlings were located. One such property has been plowed and planted to rice. The inspection work included old infected properties in Harris County and in Jefferson County, near Hamshire. Abandoned and escaped citrus trees continued to be located and destroyed. Owners of estates growing *C. trifoliata* as hedges are cooperating well with the program. Citrus-growing nurseries also were inspected in Brazoria, Harris, and Victoria Counties.

CONTROL INVESTIGATIONS

Methyl bromide fumigation of green lima beans.--Randall Latta reports that methyl bromide fumigation of green lima beans imported from Cuba, for the destruction of pod borer larvae (*Maruca testulalis* Geyer), has recently been placed on a routine commercial basis. From November 1 until December 15, approximately 15,000 hampers were fumigated upon arrival in New York. During the first part of December a new fumigation plant was completed in Havana, Cuba, and was put in operation by December 14; therefore, since that date all beans (approximately 12,000 hampers) have been treated before being exported from Cuba. Mr. Latta tested the new equipment and supervised operation of the plant for the first few fumigations. The crop for this year is estimated at 100,000 hampers, all of which will be treated.

BEE CULTURE

Pollen in nectar seems stimulus for brood-rearing.--The following is taken from a report by Frank E. Todd, Davis, Calif.: "We have been giving two of our colonies a large reserve of pollen paste and under those conditions brood-rearing has been sustained, but the unexpected result was that no great expansion took place. In one of these colonies we added a small amount of pollen to the sirup we were feeding and the brood nest expanded rapidly until it filled the available space in the lower comb. At the same time the colony next to it, which was given a large supply of paste, failed to expand its brood nest, but maintained it at about the same size. This suggests to us that it is the pollen in the nectar which acts as a stimulus to brood-rearing. This, we believe, is significant. In a third colony the queen had not been laying for 6 weeks, although we had been feeding it sugar sirup. It had a few cells of pollen reserve. To this colony we gave some pollen in the sugar sirup at 2 o'clock one afternoon. The queen was laying eggs very rapidly the following morning. Egg laying continued to expand until she had filled most of the lower combs. This colony has no pollen paste and we are waiting to see whether expansion will continue where the brood is not brought through. We can see the application of the principle involved in the expanding brood nests of colonies on certain honey flows, in which the nectar is inclined to be laden with pollen, such as certain fruit bloom, and perhaps dandelion. We can also imagine how a pollen reserve which is covered with honey may cause egg laying during winter due to the pollen which would be taken up in the honey."

Soybean flour, "Nutrisoy," has value as a supplement to pollen in stimulating brood-rearing.--C. L. Farrar and C. W. Schaefer, Madison, Wis., report effective stimulation of brood-rearing by feeding nutrisoy mixed with 50, 25, and 12.5 percent pollen. The 50 and 25 percent mixtures appeared to be equal to pure pollen, whereas the 12.5 percent mixture tended to become "leathery," and probably is not so readily available to the bees. Nutrisoy alone increased brood production for about 2 weeks, indicating that some essential material present in pollen may be obtained from the body reserves of the nurse bees. One hundred grams of pollen plus nutrisoy provided food for more bees than did 100 grams of pollen. Check colonies reared only a neglible amount of brood. The tests are being made with 18 colonies under greenhouse conditions. The materials are fed in moist cake form by mixing the dry foods with sugar sirup (50 percent). The cakes are placed over the brood combs and covered with paraffined paper to prevent drying. Reserve honey and water are available to each colony.

A 25-story structure not satisfactory substitute for isolated mating station.--Otto Mackensen, Baton Rouge, La., reports that yellow queens permitted to fly from droneless nuclei on the 25th floor of the State Capitol, at Baton Rouge mated normally and their dark worker offspring indicated that these queens had mated with black drones. The nearest known colonies containing drones of this color were some that had been placed on the ground near the building as part of the experiment. Most of the yellow queens permitted to mate after yellow drones were added to the nuclei produced workers as dark as the workers of the queens mated from droneless nuclei and usually darker than queens artificially mated with yellow drones.

IDENTIFICATION AND CLASSIFICATION OF INSECTS

An interesting record for a wingless cranefly.--Alan Stone has recently received 28 specimens of the wingless cranefly (*Chionea primitiva* Alexander) which were trapped in a cave at Harpers Ferry, W. Va., by M. F. Briscoe, of Storer College. This collection is of interest because it is a little-known species, described from a single male collected at Owasco Lake, N. Y., and because of the unusual habitat for these specimens. They were found in 1 trap only, about 85 feet from the only known entrance to the cave, in total darkness, and no closer entrance has been found. Traps nearer the opening contained no specimens. Flies of the genus *Chionea* are usually found on the snow, and how these specimens got so far into the cave and why they congregated at the point where they were trapped is difficult to explain.

On a parasite of the so-called brown-banded roach.--Specimens of a parasite reared by R. A. Flock at Tucson, Ariz., in 1939, from eggs of the cockroach *Supella supellectilium* (Serville) have been identified by A. B. Gahan as *Anastatus blattidarum* Ferriere and the identification has been confirmed by Ch. Ferriere, of the British Museum, author of the species. The host cockroach is widely distributed and the parasite is now known to occur in the Sudan, Egypt, India, and in the United States. Specimens of this *Anastatus* have been taken at Beaumont, Tex., as well as at Tucson.

Changes in the names of two of the introduced species of Diprion.--Recently, R. B. Benson (Bul. Ent. Res., v. 30, p. 341, 1939) has proposed a new genus, *Gilpinia*, into which he has transferred the species *Diprion polytomum* and *D. frutetorum*. In accordance with this paper, the name for the European spruce sawfly now is *Gilpinia polytoma* (Htg.), while *Diprion frutetorum* becomes *Gilpinia frutetorum* (F.). The name for the introduced pine sawfly remains *Diprion simile* (Htg.).

Mating habit in an ant of the genus Eciton.--Among the interesting specimens of ants collected in connection with the Argentine ant scouting work conducted by the Bureau of Entomology and Plant Quarantine during 1931-33 is that of an *Eciton* (*Acamatus*) *carolinensis* Emery queen, which was collected while mating with a wingless male. The mated pair were taken from a rotten oak stump at Spartanburg, S. C., by D. E. Read on May 27, 1932. There are no records to indicate that such an incident as this has ever been observed before in the United States. Since two other wingless males were collected from the same nest as the mating pair, it may be that mating takes place within the parental colony, as is true with many species of ants.

Investigation of certain names of Corrodentia.--For several years it has been felt that the names of two common and widespread species of booklice, *Trogium pulsatorium* (L.) and *Liposcelis divinatorius* (Mull.), should be thoroughly investigated, to determine if the names in use by the Bureau were nomenclatorially correct. It was decided that the former species had been correctly named, but that *Troctes*, which had been used for the latter species, should be discontinued in favor of *Liposcelis* which has already been used by certain taxonomists. The investigation involved a

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study of the literature concerned with the original proposals and subsequent usage of the generic names *Trogium* Illiger, *Atropos* Leach, *Troctes* Burm., *Lachesilla* West., *Clothilla* West., and *Liposcelis* Motsch. The failure to designate genotypes and probable misidentifications of these small insects on the part of early authors was instrumental in bringing about the confusion. A. B. Gurney has recently outlined (Jour. Wash. Acad. Sci., v. 29, No. 11, pp. 509-515, 1939) the data which lead to the above conclusions. The use of the family name Trogiidae, instead of Atropidae, was also found advisable. Though there are no definite rules governing the use of ordinal names of insects, Corrodentia is preferred to Psocoptera or Copeognatha, which are used by some writers.

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